

Sampling Liquid Animal Waste

WHY SAMPLE?

Livestock waste is an excellent soil amendment and fertilizer. Livestock waste contains valuable macro- and micro-nutrients for plant growth. It also supplies organic matter to improve soil tilth and nutrient retention. A sound waste application plan should be based on the nutrient requirement of a specific crop and nutrient content of the waste used. There are pitfalls to poor waste management. Over-application may cause surface and groundwater pollution. You will not reap the full benefit of livestock waste if it is under-applied. In order to know the nutrient requirement of a crop, you must test the soil. In order to know the nutrient content of livestock waste, you must test the waste.

Recycling nutrients through land application is not the only beneficial use of livestock waste; however this job sheet only deals with land application of livestock waste.

WHAT TO TEST FOR

A complete list of land application analyses are given in Table 1. To properly use animal waste as fertilizer, you need to know the concentrations of the major fertilizer nutrients – N, P, and K. Salts and sodium buildup in the soil profile can be a concern with repeated land application, thus Electric Conductivity (EC) or Total Salts, and Base Cations (Ca, Mg, and Na) should be tested for as well. Application rate is often tied to the amount of solid material spread; therefore, test for total solids or moisture content.

Table 1. Analyses Needed.

Total Solids	NH ₄ -N
Total N	Total P
Total K	EC
Ca, Mg, and Na	
Solids Accumulation Ratio	

VARIABILITY OF WASTE

The characteristics of livestock waste varies greatly from operation to operation. The character of waste leaving a building or confinement area depends on animal species, size and number of animals housed, the ration fed to the animals, and amount of water or bedding added to the waste. Once raw livestock waste leaves the building, it may undergo even more

changes. The nutrient and organic matter of stored or treated waste vary depending on time of year.

Sample and analyze livestock waste closest to point where it will be used. If you only use waste at a certain time of year, sample only during that time. Take samples at least once per year and whenever waste handling procedures change. If you use waste throughout the year, sample more frequently. Over time, you may begin to see a predictable pattern of livestock waste analyses emerge.

SAMPLING PROCEDURES

The accuracy of an expensive chemical analysis is only as accurate as the sample sent to the lab. You must collect a sample that represents the material you are using. Use the following procedures for collecting livestock waste samples:

Sampling Lagoon Effluent

If you only pump effluent from the top of a lagoon, you only need to take a sample from upper two feet. A simple lagoon sampler is a rope attached to a small plastic bucket. Throw the bucket out into the lagoon and let it sink. Slowly pull the bucket back to shore, being careful not to collect scum or solids with the sample. Swirl the bucket and pour a sub-sample into a plastic container.

If you object to handling an effluent covered rope, use a plastic bottle securely taped to a long pole. Dip out several small samples and mix together in a bucket. Dipping is less accurate than the bucket-throw method. Make sure the pole is long enough to reach over any scum collected at the edge of the lagoon. Dip out a number of samples at different depths and locations. Swirl the bucket and pour a sub-sample into a plastic container.

Samples taken from the upper layer of the lagoon will represent the contents of the layer for several weeks. It is possible to sample the lagoon ahead of time and have results back in time to calculate an application rate before irrigating.

Sampling From Other Types of Waste Storage Structures

Layers form in other types of waste storage structures just as they do in a lagoon. However, you spread the

entire contents of a storage pond or settling basin -- not just the top portion. Since you spread the entire contents, you must take samples while the pond is mixed or agitated. Use the bucket-throw or dipping methods to collect samples from agitated ponds. Solids content of the slurry change as the pond is pumped. Take small samples over the entire pumping period and mix into a larger sample. Remove a small sub-sample from the well-mixed sample and place in a plastic container.

Because you must take samples while agitating the pond, you will not receive a complete analysis in time to calculate an application rate. Apply at a rate based on your previous year's test results. After a number of applications, you may begin to see a consistent concentration of nutrients and solids in the analyses.

Field Sampling Using Catch Cans

Sometimes it is easier to get a representative sample by collecting samples during application. This is especially true for honey wagons and spreader trucks. Randomly place a number of catch cans in the field. Collect waste from the cans and mix in a large bucket immediately after spreading. Swirl the bucket and pour a sub-sample into a plastic container.

Collecting in the field is the best way to determine the exact amount of nitrogen being applied to the field. Samples taken from lagoons or structures do not take into account nitrogen lost to the atmosphere during application.

Sampling From Irrigation Systems

To get around the problem of collecting a representative sample from an agitated pond, and eliminate the inaccuracy caused by ammonia losses, sample the stream as it enters the irrigation system. Some irrigation systems have a valve at the spray riser. Place a bucket under the valve and open as the gun is running. Collect a number of samples while pumping, and mix together. Remove a sub-sample from the well-mixed material and place in a plastic container.

If the irrigation system does not have a valve present from which to take a sample, place a bucket or cylinder directly in the stream emitted by the nozzle. Collect a number of samples at different locations in the system. Mix samples into a composite. Remove a sub-sample of the well-mixed liquid and place in a plastic container.

Sampling From Slotted Floor Pits

Make a column sampler from a section of narrow plastic pipe narrow enough to slip through the slots of the pit -- but wide enough to collect undisturbed solids. Lower the pipe through the slots until you feel the bottom of the pit. Cap the upper end, trapping a column of waste. Empty the entire contents of the pipe into a plastic bucket. Take samples from a number of locations throughout the pit. Swirl or mix the bucket and pour a sub-sample into a plastic container. These samples can be taken a number of weeks ahead of time in order to calculate application rate before spreading.

After a Sample Has Been Collected

Once a waste sample is collected, ship in an airtight container to the laboratory of your choice. Some laboratories supply sampling kits on request.

Ship liquid and slurry samples in a quart sized plastic bottle with a screw top lid. Only fill the bottle half-full to allow for gas expansion. If the bottle has collapsible sides, squeeze slightly before screwing on the lid. Use cardboard boxes to ship sample bottles and bags. Pack the box tightly with styrofoam peanuts or shredded paper and seal with strapping tape.

Preservatives are generally not needed for livestock waste samples used for land application. Other analyses may require special shipping and preservation. This is especially true when collecting samples for biological or bacteriological analysis. Always consult with the testing lab before collecting samples. The representative sample you painstakingly collected may become useless if the proper shipping procedure is not used.

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